City of Bainbridge Island

Traffic Report

2015 Focused Traffic Study

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THE CITY OF BAINBRIDGE ISLAND ENGAGED PERTEET INC. TO CONDUCT AN ENGINEERING STUDY TO REVIEW EXISTING POSTED SPEED LIMITS AND SIGNING ALONG VARIOUS CORRIDORS BASED ON TRAFFIC CHARACTERISTICS AND ROADWAY GEOMETRY. THIS STUDY ALSO REVIEWED THE INTERSECTION TRAFFIC CONTROL AT ONE INTERSECTION. MULTIPLE SITE VISITS WERE MADE TO RECORD EXISTING CONDITIONS, WHICH, ALONG WITH TRAFFIC DATA, WERE USED TO MAKE RECOMMENDATIONS FOR EACH LOCATION. TABLE ES-1 IS A SUMMARY OF THE RECOMMENDATIONS MADE BASED ON LOCATION.

Table ES-1: Summary of Recommendations

Location	Study Type	Recommendation
Eagle Harbor Drive NE	Speed	Reduce the 35-mph speed limit to 30-mph.
Sunrise Drive	Speed	Reduce the 35-mph speed limit to 30-mph.
NE Lafayette Avenue	Speed	• Reduce the 35-mph speed limit to 30-mph. • Install speed reduction markings
NE Valley Road	Speed	• Maintain current posted speed limit. • Install a reduced speed limit ahead (W3-5) sign prior to the 25-mph speed sign for eastbound traffic. • Install supplementary "ON ROADWAY" signs beneath existing bicycle and pedestrian warning signs.
Phelps Road NE	Speed	Reduce the 40-mph speed limit to 30-mph
Washington Avenue NE and Euclid Avenue NE	Signage	• Maintain current posted speed limit. • Maintain existing intersection control (3-way stop). • Install one W4-4b warning sign and two W4-4a signs under the existing stop signs.
High School Road NW/NE	Signage and Safety	• Maintain the current speed limit for the corridor. • Extend island in front of high school farther east to separate the parking area from the travel lanes. • Remove street parking in the vicinity of roundabout at Madison Avenue to allow more space for maneuvering. • Change the angled parking near Hildebrand Lane to "back in/head-out" parking to improve the safety for vehicles, pedestrians, and bicyclists. • Install RRFB at crosswalk just west of Hildebrand Lane

1.0 INTRODUCTION AND METHODOLOGY

A series of engineering studies were conducted for six segments and one intersection for the City of Bainbridge Island to determine whether the existing speed limits and traffic control are adequate given the geometric, environmental and traffic conditions. Concerns regarding the safety of pedestrians and bicyclists are a driving factor for this study. The 85th percentile speeds and average daily traffic data from a 2012 study were provided by the City. Perteet compared the land uses from 2012 and 2015 to determine if the current condition changed significantly. If land use changed significantly, Perteet recorded new data for use in this study. Each section of the report includes a discussion of existing conditions, collision history, and issues that were identified during the study.

Determining speed limits is both a quantitative and qualitative effort. Traditionally, speed limits have set at the 85th percentile speed of free-flow traffic. However, other factors including lane geometry, roadway alignment, collision history, and bicycle and pedestrian usage were also included in this review. A quantitative tool--USLIMITS2 developed by the Federal Highway Administration (FHWA)—was used to incorporate this range of factors. This program recommends a speed limit for the corridor based on all available geometric, collision, and traffic data. Perteet used these recommendations as a preliminary basis. Additional details are documented in the report.

2.0 EAGLE HARBOR DRIVE NE: MCDONALD AVENUE NE TO TAYLOR AVENUE NE

Eagle Harbor Drive NE is a minor arterial that connects Wyatt Way NW to Rockaway Beach Road NE, traveling along the southern coast of Eagle Harbor. A horizontal curve in the vicinity of McDonald Avenue NE changes the alignment to run east-west. Eagle Harbor Drive NE has an average daily traffic volume of 1,900 vehicles per day (vpd). The primary objective for this study was to determine whether the existing 35 miles per hour (mph) speed limit on the corridor between McDonald Avenue NE and Taylor Avenue NE is appropriate. Figure 2-1 shows the project limits with the posted regulatory and warning signing along the roadway.

Eagle Harbor Drive NE has one signed speed zone of 35 mph. The corridor characteristics are similar throughout the study limits. The characteristics are summarized in Table 2-1.

Table 2-1: Characteristics Summary of Eagle Harbor Drive NE

Item	Eagle Harbor Drive NE
Geometry	
Alignment	East-west
Lanes (per direction)	1
Lane Width	9’
Shoulder Width	0 to 4’
Horizontal Curves	Minor
Vertical Curves	Multiple, minor
Surrounding Environment	
Setting	Forested
Roadside Ditches	Occasional
Private Driveways	Frequent
Pull-Out Areas	Frequent along north side
Clear Zones	Periodic trees, mailboxes, utility poles and telephone pedestal
Curb, Gutter and Sidewalk	Not present
Lighting	Not present
Traffic Control	
Lane Markings	Marked centerline and edge lines
Speed Limit	35 mph
Major Intersections	McDonald Avenue NE, Rose Avenue NE, Taylor Avenue NE

Figure 2-1: Eagle Harbor Drive NE Corridor Map with Signing

2.2 Collision History

Four reported collisions occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 2-2.

Table 2-2: Collision Report Summary for Eagle Harbor Drive NE

Date	Time	Description
2/11/2011	17:55	V1 struck deer.
3/4/2011	14:25	V1 ran off roadway and hit two trees.
1/23/2012	9:18	V1 spun out on ice and landed in hedge. Damage to hedge and vehicle.
5/3/2012	15:04	Driver was backing out of New Sweden and hit telephone pole, breaking it at the base.

There are no observed patterns in the collision history.

The collision rate was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 2-3 summarizes the collision rates for Eagle Harbor Drive NE, with a comparison to county and statewide averages.

Table 2-3: Collision Rates for Eagle Harbor Drive NE

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
Eagle Harbor Dr NE	4	1,900	0.76	4	1.90
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The corridor has collision rates higher than the average for Kitsap County. FHWA recommends reducing the speed limit if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. This portion of Eagle Harbor Drive NE exceeds this collision rate. Therefore, a reduced speed limit should be considered due to collision history.

2.4 Issues and Candidate Mitigation

Based on a review of the site and data, the following issues have been identified along with potential mitigation.

Wild Animals: One of four collision reports for this corridor cite wild animals as the primary cause. Animal-based collisions can be severe as drivers may swerve quickly to avoid the animal and lose control of the vehicle, exit the roadway, or strike a road user. Currently, there are no warning signs highlighting the presence of animals in the area. The WSDOT Traffic Manual recommends that one of the following criteria be met prior to installation of a deer crossing sign:

1. Minimum of five (5) documented deer/vehicle collisions per mile per year for at least two (2) of the past ten (10) years.
2. Minimum of ten (10) carcass counts per mile per year for at least three (3) of the past ten (10) years.

This analysis was only able to evaluate criterion (1) based on available information. There has been one collision related to deer since 2011. This criterion is not met and, therefore, wildlife warning signs are not recommended.

Bicycle Facilities: The City of Bainbridge Island's Non-Motorized Transportation Plan recommends shoulder facilities on both sides of NE Eagle Harbor. The addition of a shoulder facility in this corridor would provide an increase in bicyclist and pedestrian safety and comfort. However, due to the existing conditions, including limited right-of-way, roadside obstructions including privacy walls built on private property, shoulder facilities are not a feasible option in this location in the near-term. Reducing motor vehicle speeds would increase bicyclist and pedestrian safety and comfort levels for those modes traveling along Eagle Harbor Drive NE. This reduction in speeds can be partially accomplished through the reduction in the posted speed limit.

Lane Width and Clear Zone: The lane width along the corridor is 9-feet. Lane widths for a 35 mph corridor typically range from 10-ft to 11-feet. Lower lane widths typically result in slower speeds as drivers attempt to stay within the lane. The standard lane width for the City of Bainbridge Island is 10-feet. Lane widths below 10-feet can result in increases in collisions, especially when vehicle speeds are high. This is the result of drivers' difficulty in maintaining a course at speed. Additionally, lower lane widths at higher speeds can pose difficulty for use with many modes corridors as pedestrians, bicyclists, and motorists have limited space to maneuver.

Based on the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide, the suggested clear zone for this roadway is 14 to16-feet. There is an intermittent shoulder present along the corridor which ranges between zero and four feet. There are a number of fixed objects such as mail boxes, fences, and utility poles within this zone.

Sight Distance: There are 37 driveways and 6 side street intersections along the corridor. A sight distance study was not conducted as part of this work; however, a site review and review of the collision history indicates that there are sight distance limitations, specifically at driveways along the corridor. Additionally, the intersection of New Sweden Road NE has a cross street warning sign which is indicative of a sight distance limitation for the posted 35 mph speed.

Speed: Throughout the corridor, the 85th percentile speed exceeds the posted speed limit at 41 mph. The collision rate, which is above the average county and state rates, and a review of the collision descriptions indicate that the current speed limit needs to be modified.

2.5 Recommendations

The following is recommended for the Eagle Harbor Drive NE corridor:

Reduce the 35-mph speed limit to 30 mph. This is due to a number of reasons including:

- Collision rate higher than the state average.
- 9-ft lane widths.
- Inadequate shoulder and clear zone space.

3.0 SUNRISE DRIVE NE: NE TORVANGER ROAD TO NE LAFAYETTE AVENUE

Sunrise Drive NE is a major collector that connects NE Lafayette Avenue to NE Velley Road and extends past Duncan Lane NE. Sunrise Drive NE has an average daily traffic of 1,050 vpd. The primary objective for this study was to determine the appropriate speed limit for the corridor between NE Lafayette Avenue and NE Torvanger Road. Figure 3-3 shows the project limits with the posted regulatory and warning signing along the roadway.

3.1 Project Area Description

Figure 3-1: Facing South near NE Torvanger Road

Figure 3-2: Facing North near NE Torvanger Road

Sunrise Drive NE has the characteristics listed in Table 3-1.

Table 3-1: Characteristics Summary for Sunrise Drive NE

Item	NE Sunrise Drive
Geometry	
Alignment	North-south
Lanes (per direction)	1
Lane Width	10'
Shoulder Width	0 to 2'
Horizontal Curves	None
Vertical Curves	Minor
Surrounding Environment	
Setting	Forested
Roadside Ditches	Frequent
Private Driveways	Frequent
Pull-Out Areas	Occasional
Clear Zones	Trees, mailboxes, utility poles
Curb, Gutter and Sidewalk	Not present
Lighting	Not present
Traffic Control	
Lane Markings	Marked centerline and edge lines
Speed Limit	35 mph
Major Intersections	Misty Vale Place NE

3.2 Collision Analysis

Two reported collisions occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 3-2.

Table 3-2: Collision Report Summary for Sunrise Drive NE

Date	Time	Description
7/3/2012	14:24	Vehicle 1 pulled out in front of Vehicle 2 who tried to miss and swerved, hitting 2 and 3.
6/14/2014	10:52	Vehicle 1 pulled out in front of Vehicle 2, side swiping rear of car.

There are no observed patterns in the collision history.

The collision rate for the corridor was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 3-3 summarizes the collision rate for NE Sunrise Drive NE, with a comparison to county and statewide averages.

Table 3-3: Collision Rate for Sunrise Drive NE

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
Sunrise Drive NE	2	1,050	1.0	4	1.30
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The corridor has collision rates lower than the average for Kitsap County. The Federal Highway Administration (FHWA) recommends reducing speed limits if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. This portion of Sunrise Drive NE does not exceed this collision rate. Therefore, the speed limit should not be reduced because of collision history.

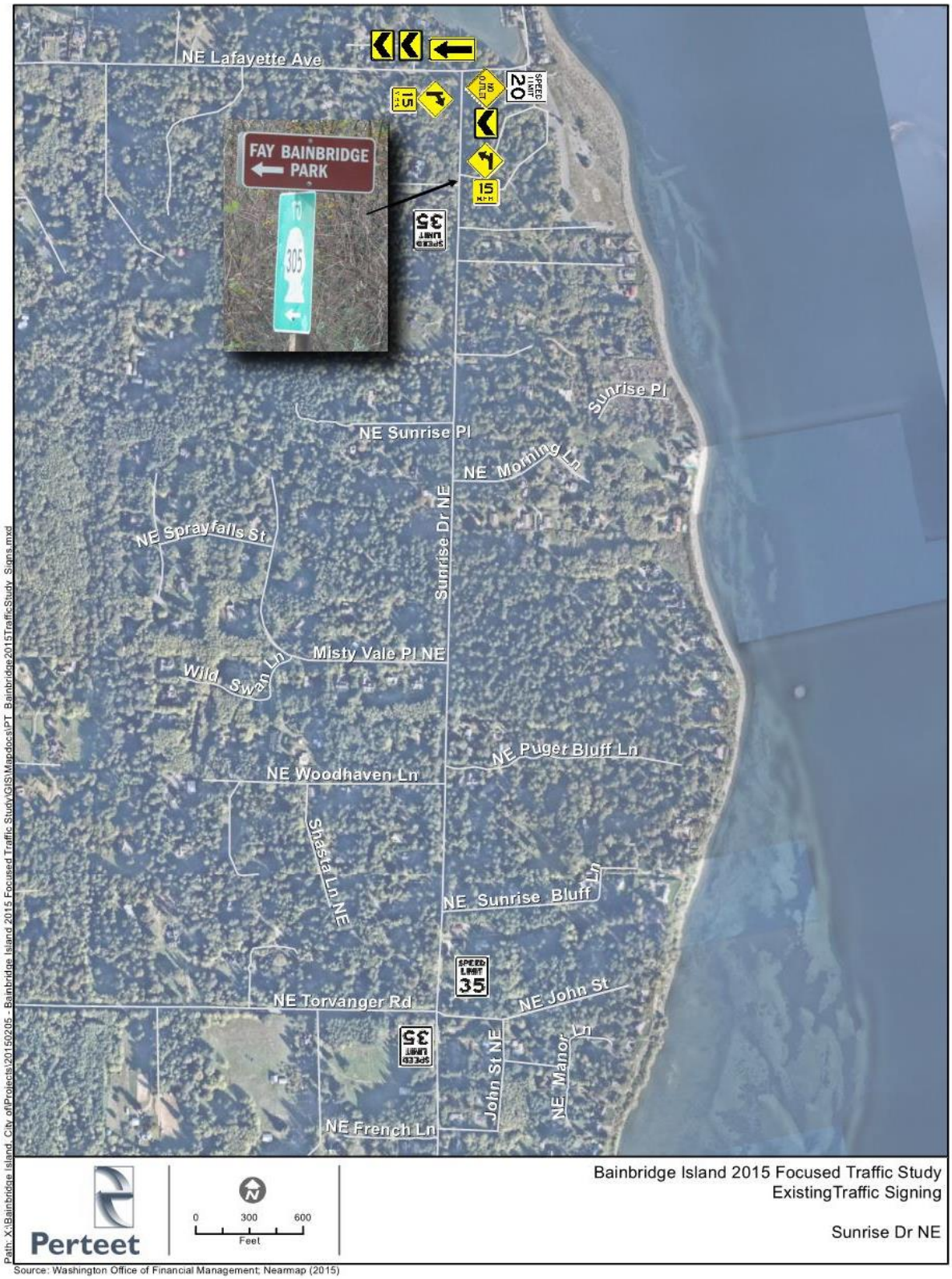


Figure 3-3: Sunrise Drive NE Corridor Map with Signing

3.4 Issues and Candidate Mitigation

Bicycle Facilities: The City of Bainbridge Island's Non-Motorized Transportation Plan recommends shoulder facilities on both sides of Sunrise Drive NE. The addition of a shoulder facility in this corridor would provide an increase in bicyclist and pedestrian safety. The addition of a shoulder facility in this corridor would provide an increase in bicyclist and pedestrian safety and comfort. However, due to the existing conditions, including limited right-of-way and roadside obstructions including utility poles and drainage ditches, shoulder facilities are not a feasible option in this location in the near-term. Reducing motor vehicle speeds would increase bicyclist and pedestrian safety and comfort levels for those modes traveling along Eagle Harbor Drive NE. This reduction in speeds can be partially accomplished through the reduction in the posted speed limit.

Lane Width and Clear Zone: The lane through along the corridor is 10-feet. Lane widths for a 35 mph corridor typically range from 10-feet to 11-feet. Lower lane widths typically result in slower speeds as drivers attempt to stay within the lane. Based on the existing conditions, the lane width is acceptable.

Based on the AASHTO Roadside Design Guide, the suggested clear zone for this roadway is 10-12 feet. There is an intermittent shoulder present along the corridor which ranges between zero and two feet. There are a number of fixed objects such as mail boxes, fences, and utility poles within this zone.

Sight Distance: There are 44 driveways and 7 side street intersections along the corridor. A sight distance study was not conducted as part of this work; however, a site review and review of the collision history indicates that there are sight distance limitations, due to frequent vertical curves and driveways along the corridor. Based on a site visit some of the vertical curves along the corridor prevent a motorist from seeing a stopped or entering vehicle from a driveway. Additionally, these vertical curves would also obstruct the view of a non-motorized user (i.e. pedestrian or bicyclist).

Speed: Throughout the corridor, the 85th percentile speed exceeds the posted speed limit at 40 mph. The collision rate, which is below the average county and state rates, and a review of the collision descriptions do not indicate that current speed limits need to be modified based on collision experience alone.

3.5 Recommendation

The following is recommended for the Sunrise Drive NE corridor:

Reduce the 35-mph speed limit to 30 mph. This is due to:

- Reduced sight distance for entering traffic and non-motorized users.
- Inadequate shoulder and clear zone space.

4.0 NE LAFAYETTE AVENUE: EUCLID AVENUE NE TO SUNRISE DRIVE NE

NE Lafayette Avenue is a major collector that connects Euclid Avenue NE (east) to Sunrise Drive NE. NE Lafayette Avenue has an average daily traffic of 800 vpd. The primary objective for this study was to determine the appropriate speed limits for the corridor between Euclid Avenue NE and Sunrise Drive NE. Figure 4-1 shows the project limits with the posted regulatory and warning signing along the roadway.

4.1 Project Area Description

NE Lafayette Avenue has one marked speed zone. The attributes for the corridor are summarized in Table 4-1.

Table 4-1: Characteristics Summary for NE Lafayette Avenue

Item	
Geometry	
Alignment	East-west
No. of Lanes (per direction)	1
Lane Width	9’
Shoulder Width	0’ to 10’
Horizontal Curves	One, small radius
Vertical Curves	Multiple, major
Surrounding Environment	
Setting	Forested
Roadside Ditches	Infrequent
Private Driveways	Frequent
Pull-Out Areas	Occasional
Clear Zones	Trees, telephone poles, mail boxes, traffic signs
Curb, Gutter and Sidewalk	Not present
Lighting	Not present
Traffic Control	
Lane Markings	Marked centerline and edge lines
Speed Limit	35 mph
Major Intersections	Euclid Avenue NE and Sunrise Drive NE

Figure 4-1: NE Lafayette Avenue Corridor Map with Signing

4.2 Collision History

Three reported collisions occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 4-2.

Table 4-2: Collision Report Summary for NE Lafayette Avenue

Date	Time	Description
2/24/2013	10:54	Bike travelling fast around curve and downhill, hit gravel, slid hitting mailbox post with body
12/4/2014	21:30	V1 unable to safely make 90 degree turn in road, collided into V2 and retaining wall
12/12/2014	0:00	V1 struck V2 (log wall) due to sharp turn, dark conditions and unfamiliarity with island

All three collisions occurred where NE Lafayette Avenue turns into NE Sunrise Drive. There are existing turn warning signs, chevrons, and arrow indications of the curve. Additionally, there is an advisory speed sign of 15 mph. From the data, it appears that drivers may be traveling too fast for conditions. Some type of speed reduction would likely reduce the occurrence of these types of collisions.

The collision rate for each speed zone was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 4-3 summarizes the collision rates for NE Lafayette Avenue, with a comparison to county and statewide averages.

Table 4-3: Collision Rates for NE Lafayette Avenue

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
NE Lafayette Avenue	3	800	0.57	4	4.51
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

This corridor has a collision rate higher than the average for Kitsap County and Washington State. FHWA recommends reducing speed limits if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. This portion of NE Lafayette Avenue exceeds this collision rate. Therefore, it may be warranted to reduce the speed limit due to collision history.

4.4 Issues and Candidate Mitigation

Speed: Throughout the corridor, the 85th percentile speed is recorded as 40 mph which exceeds the posted speed limit. The collision rate noted above suggests that the current speed limit needs to be reduced. Most of the collisions occurred in the vicinity of the 90-degree turn where NE Lafayette Avenue becomes Sunrise Drive NE. This suggests that drivers are entering the turn too fast for the curve and losing control.

Illumination: This corridor has no existing illumination, which is consistent with rural areas throughout Bainbridge Island. A lack of illumination can lead to drivers being unable to see their surroundings, including traffic control devices such as signs or obstacles such as animals that must be avoided. Because the City of Bainbridge Island does not have any warrants for illumination, this analysis used WSDOT warrants. Illumination is warranted along roadways of this type if the segment is classified as commercial and either the nighttime level of service is D or the nighttime collision warrant is satisfied. This roadway segment is not classified as commercial and, therefore, does not meet illumination warrants. However, two of the three collisions noted above at the 90

degree turn between NE Lafayette Avenue and Sunrise Drive NE occurred during nighttime hours. Illumination of this curve and intersection would alert roadway users to a change in alignment.

Note that Bainbridge Island also has a "Dark Sky" ordinance to minimize the amount of light pollution. As such, street lighting is discouraged unless absolutely necessary. Before use of illumination, it is encouraged to use other methods to enhance safety.

Bicycle Facilities: The City of Bainbridge Island's Non-Motorized Transportation Plan recommends NE Lafayette Avenue as a bikeway. The addition of bike lanes or a shoulder facility in this corridor would provide an increase in bicyclist and pedestrian safety and comfort. The addition of a shoulder facility in this corridor would provide an increase in bicyclist and pedestrian safety and comfort and also provide a recovery area for motorists if needed. NE Lafayette is classified as a collector street and is therefore considered a lower priority for implementation of such facilities behind higher speed arterials. In the near-term, reducing motor vehicle speeds would increase bicyclist and pedestrian safety and comfort levels for those modes traveling along the roadway. This reduction in speeds can be partially accomplished through the reduction in the posted speed limit.

Lane Width and Clear Zone: The lane width along the corridor is 9-feet. Lane widths for a 35 mph corridor typically range from 10-feet to 11-feet. Lower lane widths typically result in slower speeds as drivers attempt to stay within the lane. The standard lane width for the City of Bainbridge Island is 10-feet. Lane widths below 10-feet can result in increases in collisions, especially when vehicle speeds are high. This is the result of drivers' difficulty in maintaining a course at speed. Additionally, lower lane widths at higher speeds can pose difficulty for use with many modes corridors as pedestrians, bicyclists, and motorists have limited space to maneuver.

Based on the AASHTO Roadside Design Guide, the suggested clear zone for this roadway is 10-12 feet. There is an intermittent shoulder present along the corridor which ranges between zero and ten feet. There are a number of fixed objects such as mail boxes, fences, and utility poles within this zone.

Sight Distance: There are 33 driveways and one side street intersection along the corridor. A sight distance study was not conducted as part of this work; however, a site review and review of the collision history indicates that there are sight distance limitations, due to sharp turns, vertical curves and frequent driveways along the corridor.

4.5 Recommendation

The following is recommended for the NE Lafayette Avenue corridor:

Reduce the 35-mph speed limit to 30 mph. This is due to a number of reasons, including:

- Collision rate higher than the state average.
- 9-ft lane widths.
- Inadequate shoulder and clear zone space.

In addition, the following is recommended for the turn at NE Lafayette Avenue and Sunrise Drive NE:

- Install speed reduction markings in accordance with the MUTCD Part 2 on the northbound and eastbound approaches to the turn. This should help reduce driver speeds and reduce collisions.

5.0 NE VALLEY ROAD: MADISON AVENUE NE TO SUNRISE DRIVE NE

NE Valley Road is a minor arterial that connects Madison Avenue NE to Manitou Beach Drive NE. NE Valley Road has an average daily traffic volume of 2,800 vpd. The primary objective for this study was to determine the appropriate speed limits for the corridor between Madison Avenue NE and Sunrise Drive NE. Figure 5-1 shows the project limits with the posted regulatory and warning signing along the roadway.

5.1 Project Area Description

NE Valley Road has two marked speed zones with varying characteristics. The attributes for the entire corridor are summarized in Table 5-1.

Table 5-1: Characteristics Summary by Zone for NE Valley Road

Item	West Speed Zone	East Speed Zone
Geometry		
Alignment	East-west	East-west
No. of Lanes (per direction)	1	1
Lane Width	10'	10'
Shoulder Width	0' to 1'	1' to 8'
Horizontal Curves	None	None
Vertical Curves	Minor	None
Surrounding Environment		
Setting	Forested	Commercial
Roadside Ditches	North side	Present
Private Driveways	Infrequent	Infrequent
Pull-Out Areas	One, grass	Multiple, gravel
Clear Zones	Occasional obstacles, mailboxes, sign posts, telephone poles, trees	Occasional obstacles, mailboxes, sign posts, telephone poles
Curb, Gutter and Sidewalk	Not present	Not present
Lighting	Not present	Present
Parking	Not present	Parking lane on south side of NE Valley Road
Traffic Control		
Lane Markings	Marked centerline and edge lines	Marked centerline and edge lines
Speed Limit	35 mph	25 mph
Major Intersections	Madison Avenue NE, Kallgren Road NE, Hyla Avenue NE	Sunrise Drive NE

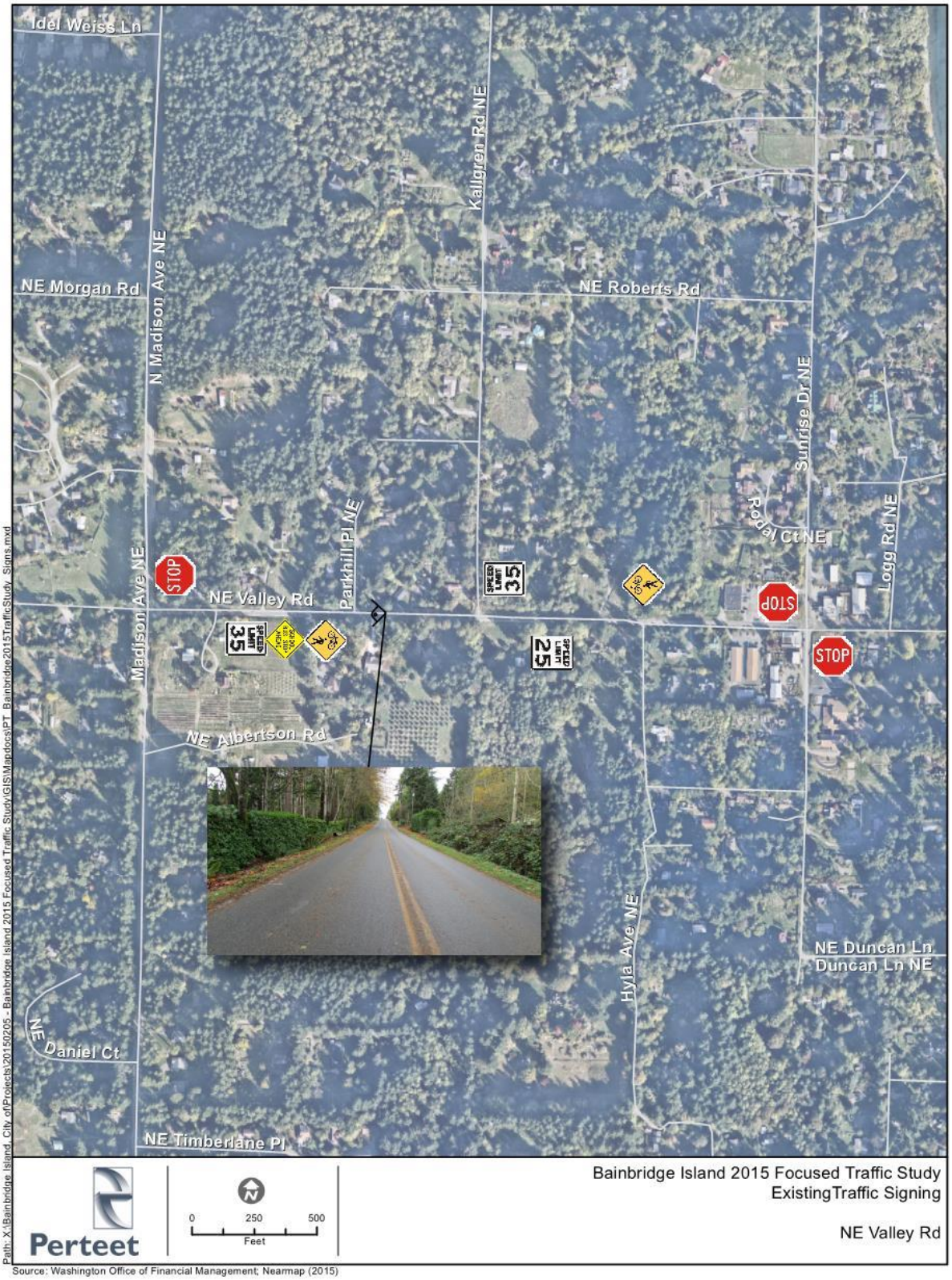


Figure 5-1: NE Valley Road Corridor Map with Signing

5.2 Collision History

Two reported collisions have occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 5-2.

Table 5-2: Collision Report Summary for NE Valley Road

Date	Time	Description
6/7/2012	7:21	Vehicle 1 failed to yield to Vehicle 2 and turned left in front of Vehicle 2.
7/14/2012	15:18	Bike started shimmying and lost control. Witness was Vehicle 2 behind him.

There are no observed patterns in the collision history.

The collision rate for each speed zone was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 5-3 summarizes the collision rates for NE Valley Road, with a comparison to county and statewide averages.

Table 5-3: Collision Rates for NE Valley Road

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
NE Valley Road	2	2,800	0.50	4	0.98
East Speed Zone	1	2,800	0.10	4	2.45
West Speed Zone	1	2,800	0.40	4	0.61
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The west speed zone and corridor as a whole have collision rates below the Kitsap County average. The east section has a higher collision rate—though it has seen only one collision since 2011—due primarily to segment length. A review of the two collisions in this segment indicates that speed may not have been the leading factor in the collision. FHWA recommends reducing speed limits if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. The east portion of NE Valley Road exceeds this collision rate; however based on the above and a review of the collision descriptions, the speed limits should not be reduced because of collision history.

5.4 Issues and Candidate Mitigation

Speed: Speed data was provided for the West Speed Zone of this corridor and found that the 85th percentile speed is the same as the posted speed limit for this area (35 mph). This reveals that drivers are obeying the posted speed limit and speeding is not a major issue for this location.

Speed Zone Limits: The speed limit along NE Valley Road changes at approximately Kallgren Road NE. West of Kallgren Road NE the speed limit is 35 mph, while east of Kallgren Road NE has a speed limit of 25 mph. There was no sign found showing the 25 mph limit east of Kallgren Road NE for the westbound lane during the field visit or from secondary research using Google Maps. A 25 mph speed limit sign was found on Manitou Beach Drive NE just south of the turn which then becomes NE Valley Road.

Clear Zone: Based on the AASHTO Roadside Design Guide, the suggested clear zone for this roadway is 12-14 feet. There is an intermittent shoulder present along the corridor which ranges between zero and eight feet. There are a number of fixed objects such as mail boxes, fences, and utility poles within this zone.

Sight Distance: There are 20 driveways and five side street intersections along the corridor. A sight distance study was not conducted as part of this work; however, a site review and review of the collision history indicates that there are sight distance limitations, due to roadside vegetation along the corridor.

Bicycle Facilities: The City of Bainbridge Island's Non-Motorized Transportation Plan recommends a bike lane on both sides of NE Valley Road. The addition of bike lanes in this corridor would provide an increase in bicyclist safety. Currently, the City has installed warning signs on the corridor to alert motorists of the presence of bikes and pedestrians using the roadway.

5.5 Recommendation

The following is recommended for the NE Valley Road corridor:

1. Maintain current posted speed limits.
2. Install a 25 mph speed limit sign for westbound traffic approximately 150 feet in advance of the intersection of NE Valley Road and Sunrise Drive E.
3. Install a reduced speed limit ahead (W3-5) sign prior to the 25 mph speed sign for eastbound traffic.
4. Install supplementary "ON ROADWAY" signs beneath existing bicycle and pedestrian warning signs.

6.0 PHELPS ROAD NE: MADISON AVENUE NE TO NE HIDDEN COVE ROAD

Phelps Road NE is a minor arterial that connects the Port Madison area to State Route 305 (SR-305). Phelps Road NE has an average daily traffic volume of 1,350 vpd, and is a known route for cut through traffic from SR 305. The primary objective for this study was to determine the appropriate speed limits for the corridor between Madison Avenue NE and Hidden Cove Road. Figure 6-1 shows the project limits with the posted regulatory and warning signing along the roadway.

6.1 Project Area Description

Phelps Road NE has two marked speed zones with varying characteristics. The attributes for the entire corridor are summarized in Table 6-1.

Table 6-1: Characteristics Summary for Phelps Road NE

Item	
Geometry	
Alignment	North-south
No. of Lanes (per direction)	1
Lane Width	11’
Shoulder Width	0’ to 1’
Horizontal Curves	None
Vertical Curves	None
Surrounding Environment	
Setting	Forested
Roadside Ditches	Continuous along east side
Private Driveways	Frequent
Pull-Out Areas	Multiple (dirt/grass/gravel)
Clear Zones	Infrequent obstacles, occasionally encroaching vegetation
Curb, Gutter and Sidewalk	Not present
Lighting	Not present
Guardrails	Not present
Traffic Control	
Lane Markings	Marked centerline and edge lines
Speed Limit	40 mph
Major Intersections	Madison Ave NE, NE Hidden Cove Road

6.2 Collision History

Two reported collisions have occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 6-2.

Table 6-2: Collision Report Summary for Phelps Road NE

Date	Time	Description
8/18/2011	3:30	Vehicle 1 failed to yield at stop sign and drove into yard.
1/5/2014	14:07	Vehicle 1 lost control and drove into ditch after hitting tree.

There are no observed patterns in the collision history.

The collision rate was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 6-3 summarizes the collision rates for Phelps Road NE, with a comparison to county and statewide averages.

Table 6-3: Collision Rates for Phelps Road NE

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
Phelps Road NE	2	1,350	0.19	4	5.34
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The collision rate for the corridor segment exceeds the county average. A review of the collisions indicates that speed is not a major factor in either of the collisions. FHWA recommends reducing speed limits if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. This portion of Phelps Road NE exceeds this collision rate, which may indicate a need to lower the speed limit. However, after analyzing the collision data, it appears that speed is not a primary issue in the collision history.

6.4 Issues and Candidate Mitigation

Speed: The 85th percentile speed (44 mph) exceeds the posted speed (40 mph) throughout this corridor. A review of the collision history doesn't indicate that speeding is a primary cause of collisions. However, there have been only two collisions on this corridor in the past five years resulting in a lack of data to review. North of the study area, Phelps Road NE has a speed limit of 25 mph. Within the study zone and to the south, Phelps Road NE has a speed limit of 40 mph. Speed zones should be as consistent as possible to meet driver expectations. In this location, the speed limits change from 25 mph to 40 mph to 30 mph. The City plans to lower the 40 mph section to 35 mph, implementing a new City-wide maximum speed limit of 35 mph. A further reduction to 30-mph would result in higher continuity among segments of Phelps Road NE. This speed reduction will mean less dramatic changes in speed between segments of Phelps Road NE, improving the safety of drivers.

6.5 Recommendation

The following is recommended for the Phelps Road NE corridor:

Reduce 40mph speed limit to 30mph. This is due to a number of reasons, including:

- Provide consistent speed limit transitions
- Collision rate higher than state average

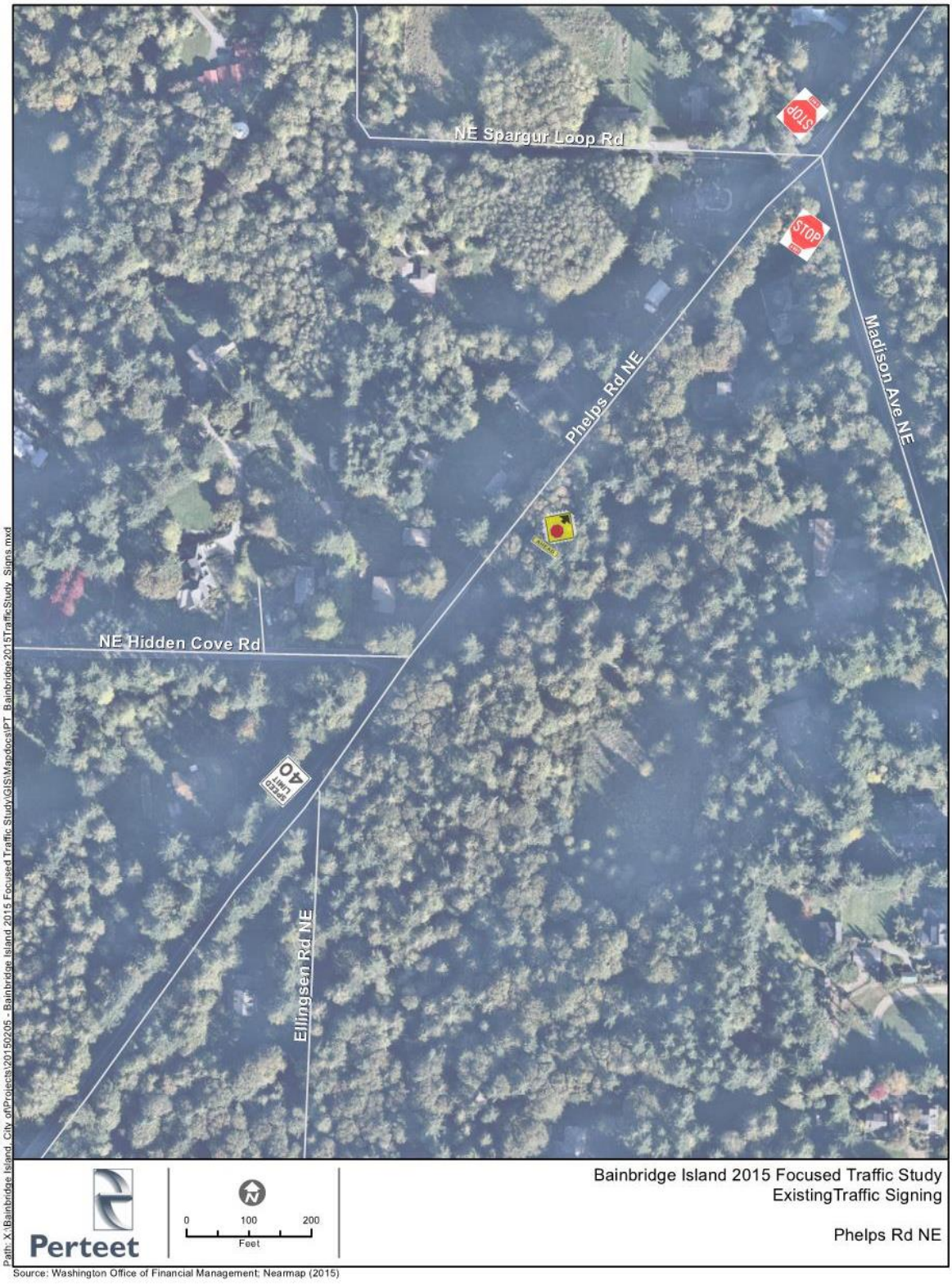


Figure 6-1: Phelps Road NE Corridor Map with Signing

7.0 WASHINGTON AVENUE NE AND EUCLID AVENUE NE

Washington Avenue NE intersects Euclid Avenue NE twice in the Northeast corner of Bainbridge Island. The southernmost intersection is approximately 2,000 ft northeast of Hidden Cove Park and is the only intersection involved in this study. At this location, Washington Avenue NE and Euclid Avenue N E are both classified as major collector roads. Euclid Avenue NE has an average daily traffic volume of 560 vpd. The primary objective for this study was to analyze the existing traffic control and speed limits to determine if they are adequate. Figure 7-1 shows the project limits with the posted regulatory and warning signing along the roadway.

7.1 Project Area Description

Washington Avenue NE has a posted speed limit of 25 mph turning into Phelps Road NE at the intersection with Euclid Avenue NE. Euclid Avenue NE has a posted speed limit of 25 mph west of Washington Avenue NE and 35 mph east of Washington Avenue NE. The location of this intersection is in a highly wooded, residential area. All approaches have a stop sign other than the northbound direction, making this a three-way stop intersection.

7.2 Collision History

Two reported collisions occurred at this intersection from January 1, 2011, to December 31, 2014. The collision is summarized in Table 7-1.

Table 7-1: Collision Report Summary for the Intersection of Washington Avenue NE and Euclid Avenue NE

Date	Time	Description
5/10/2014	23:00	Vehicle found off road in bushes, no driver. Next day, driver stated he was speeding.
6/23/2014	5:53	Deer jumped in front of vehicle - reportable damage/car towed.

There are no observed patterns in the collision history.

7.3 Turning Movements

A turning movement count was taken on Wednesday, December 9, 2015, between 4pm and 6pm. Weather conditions were clear, with low temperatures. The results of this count are shown in Table 7-2.

Table 7-2: Turning Movement Count for Washington Avenue NE and Euclid Avenue NE

Time	Northbound			Southbound			Eastbound			Westbound		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
4:00	5	3	8	0	0	0	0	0	4	14	0	0
4:15	4	3	9	0	1	0	0	1	1	9	0	0
4:30	3	1	3	0	5	0	0	0	2	5	0	0
4:45	0	2	9	0	5	0	1	0	0	6	0	0
5:00	2	4	4	0	0	0	0	0	3	4	0	0
5:15	1	1	6	0	2	0	0	1	0	3	1	0
5:30	1	2	9	0	0	0	0	0	2	3	1	0
5:45	1	4	4	0	1	1	0	0	1	4	0	0
Total	**17**	**20**	**52**	**0**	**14**	**1**	**1**	**2**	**13**	**48**	**2**	**0**

Figure 7-1: Washington Avenue NE and Euclid Avenue NE Intersection Map with Signing

The peak hour for this intersection was found to be 4:00 to 5:00pm. The predominant movement at this intersection is the northbound right turn and the concurrent westbound left turn which account for 59% of the total movements made at this intersection.

There was pedestrian and bicyclist activity at this intersection.

7.4 Issues and Candidate Mitigation

Roadside Environment: All legs of this intersection have heavy vegetation on both sides with little to no shoulder. This forested environment decreases the sight distances for drivers, and leaves pedestrians and bicyclists without any protection in the form of a sidewalk or buffer.

Traffic Control: The traffic control for this intersection meets the MUTCD requirements for stop control. However, having a three-way stop at a four-way intersection is uncommon. For example, stop signs are typically on side streets opposite each other. Due to the predominant movement, this type of approach is not recommended for this intersection. To compensate for potential roadway user confusion, the intersection traffic control should be modified with supplemental signs indicating that northbound traffic does not stop.

7.5 Recommendation

The following is recommended for the Washington Avenue NE and Euclid Avenue NE intersection:

1. Maintain the existing traffic control at the intersection. Install one W4-4b warning sign ("ONCOMING TRAFFIC DOES NOT STOP") for the southbound approach below the existing stop sign, and two W4-4a signs on the existing stop sign posts for eastbound and westbound directions. These signs would read "TRAFFIC FROM LEFT (or RIGHT) DOES NOT STOP".

8.0 HIGH SCHOOL ROAD NE: LOVELL AVENUE NW TO FERNCLIFF AVENUE NE

High School Road NE is a minor arterial that connects Fletcher Bay Road to SR 305 and the Wing Point Golf and Country Club. High School Road NE has an average daily traffic volume of 5,300 vpd. The primary objective for this study was to determine the appropriate speed limit and signage for the corridor between Lovell Avenue NW and Ferncliff Avenue NE and identify and necessary safety improvements. F igure 8-1 shows the project limits with the posted regulatory and warning signing along the roadway.

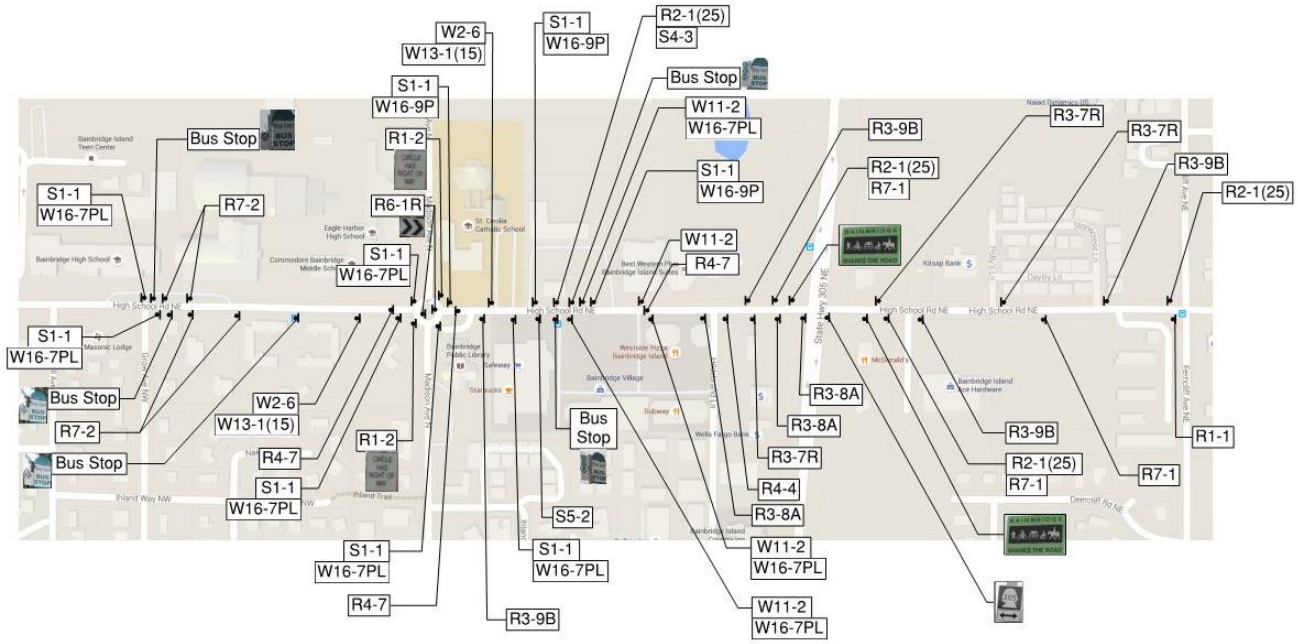


Figure 8-1: High School Road NE Corridor Map with Signing

8.1 Project Area Description

Figure 8-2: Facing West

Figure 8-3: Facing East

High School Road NE has the characteristics listed in Table 8-1.

Table 8-1: Characteristics Summary for High School Road NE

Item	High School Road NE
Geometry	
Alignment	East-west
Lanes (per direction)	1
Lane Width	10' (west of SR 305); 11' (east of SR 305)
Bike Lane Width	4.5' (west of SR 305), 4' (east of SR 305)
Horizontal Curves	None
Vertical Curves	None
Surrounding Environment	
Setting	Commercial
Roadside Ditches	Not present
Private Driveways	Frequent
Pull-Out Areas	Not present
Clear Zones	Infrequent obstacles
Curb, Gutter and Sidewalk	Present
Lighting	Present
Traffic Control	
Lane Markings	Marked centerline and edge lines
Speed Limit	25 mph
Major Intersections	Roundabout at Madison Avenue N, Signal at State Highway 305 NE, Stop at Ferncliff Avenue NE

The speed limit for eastbound and westbound traffic is posted as 25 mph along the corridor. At the roundabout, there is an advisory speed of 15 mph. Both eastbound and westbound traffic enters the study area at 25 mph and is then stepped-down to 20 mph during school zone hours (7 am to 5 pm, Monday through Friday).

8.2 Collision Analysis

Forty-one reported collisions have occurred along this segment from January 1, 2011, to December 31, 2014. Each collision is summarized in Table 8-2.

Table 8-2: Collision Report Summary for High School Road NE

Date	Time	Description
2/17/2011	19:35	V1 struck v2 when v2 failed to yield during left turn
2/28/2011	-	V1 and v2 struck each other as each attempted to back from parking space
4/4/2011	15:30	V1 struck v2 from behind while nearing roundabout
5/19/2011	16:44	V2 struck by v1 while stopped for traffic
6/2/2011	8:40	V2 struck by v1 when v1 failed to yield right of way
6/13/2011	16:45	V1 struck v2 while exiting parking stall
6/15/2011	7:22	V2 struck by v1 after v1 failed to stop for traffic
6/30/2011	13:00	V2 rear-ended by v1 who was admittedly not paying attention to traffic
8/13/2011	0:01	V1 failed to negotiate roundabout and hit city sign
8/21/2011	1:11	V2 struck v1 while backing out of parking stall
8/23/2011	14:42	V1 struck v2 while failing to stop for traffic
8/24/2011	11:50	V1 struck v2 while trying to park
8/27/2011	0:00	V1 struck v2 while backing out of parking stall

Table 8-2: Collision Report Summary for High School Road NE (continued)

Date	Time	Description
9/8/2011	17:05	V1 struck v2 while failing to yield to traffic
9/8/2011	21:44	V1 struck v2 while backing out of parking stall
11/4/2011	8:15	V1 struck the open passenger door of v2 which was parked in traffic lane
11/22/2011	17:45	V1 struck v2 while exiting parking space
11/29/2011	15:57	V1 struck v2 while driving under the influence
12/12/2011	14:00	V2 reported damage by hit & run driver. No information on v1.
2/28/2012	0:00	Veh 1 backed out in to veh 2
3/16/2012	8:40	Veh 1 rear ended veh 2 and pushed veh 2 into veh 3.
5/12/2012	18:12	Veh 2 hit veh 1 passing on the left squeezing between veh 1 and oncoming traffic. Veh 2 then hit motorcycle
5/15/2012	9:40	Veh 1 struck veh 2 while exiting parking lot.
3/15/2013	14:47	V1 came over crest of hill, unable to stop before RE V2
8/9/2013	15:30	V1 backing out of parking space into path of v2
8/26/2013	13:45	V1 struck by v2 when stopped at light
9/18/2013	8:35	V2 struck in rear end by v1 due to following too closely in heavy pedestrian & vehicular traffic
10/10/2013	17:05	V2 stopped for traffic was struck in rear by v1
11/25/2013	11:57	V1 backing out of parking space into pathway of v2
1/11/2014	13:00	V1 failed to yield to oncoming traffic in attempting turn
2/7/2014	18:14	Pedestrian in crosswalk struck by driver cited for inattention & failing to yield to pedestrian
3/19/2014	16:55	V2 sleepy and rear ended V1, who was stopped to make a turn.
4/23/2014	8:07	Driver hit Gas instead of brake and hit building.
5/6/2014	12:40	Parking but foot slipped off brake, car hit store broke window
7/3/2014	15:00	Bicyclist ran into turning car
7/9/2014	8:22	Truck pulling two flatbed trailers unable to negotiate roundabout; ran over foliage, signage, sprinkle
9/30/2014	18:23	V2 struck in rear by V1, V2 then collided into V3
11/6/2014	13:55	V2 slowed to cross oncoming lane to turn into parking lot of business was struck in rear by V1
12/3/2014	17:19	V1 collided into building when foot hit gas instead of brakes
12/4/2014	17:08	Unknown why driver lost control & collided into sign & median; officer ordered driver re-exam
12/8/2014	7:23	Pedestrian(V2) entering crosswalk was struck by V1

The collision rate for the corridor was calculated based on the number of reported collisions, daily traffic volumes, segment length, and collision history duration. Table 8-3 summarizes the collision rate for High School Road NE, with a comparison to county and statewide averages.

Table 8-3: Collision Rate for High School Road NE

Location	Collisions	Average Daily Traffic (vpd)	Study Length (miles)	Collision History (years)	Collisions per Million Veh-Miles
High School Road NE	41	5,300	0.76	4	6.97
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The corridor has a higher collision rate than the Kitsap County average. FHWA recommends reducing speed limits if collision rates exceed the statewide average. The average collision rate for Washington State is 1.74 collisions per million vehicle miles. High School Road NE exceeds this collision rate. Therefore, the speed limit may be reduced because of collision history.

This corridor has the highest number of pedestrian and bicycle related collisions on Bainbridge Island. This is primarily due to the high traffic volume and the high volume of bicyclists and pedestrians. There are major pedestrian generators along this corridor, including Bainbridge High School, Eagle Harbor High School, Commodore Options School, St. Cecilia Catholic School, the Bainbridge Village shopping center, and residential developments to the east of SR 305. These collisions are shown graphically in Figure 8-4.

Analysis of the pedestrian and bicycle related collisions revealed a cluster of three collisions occurring within a 6-month period near the same crosswalk. This crosswalk is located approximately 450-ft west of SR 305 and is within 150-ft or less of three separate side streets or commercial driveways (including Hildebrand Lane). This pattern indicates that additional safety measures should be taken at this location. Currently, this is a marked crosswalk with a median island for pedestrians. Additional safety measures could include the installation of traffic calming elements, HAWK signal, or RRFB.

8.3 Speed Survey

Due to land use changes between 2012, when the City collected speed and volume data, and 2015, a radar speed survey was taken on December 9, 2015. The weather was sunny, dry, and clear. T able 8-4 is a summary of this study. Traffic was light, with virtually no platoons and a random flow rate.

Table 8-4: Radar Speed Survey for High School Road NE

Location	Sample Size	Speed Limit (mph)	Mean Speed (mph)	10-mph Pace	Percent Within Pace	85th Percentile Speed (mph)
Lovell Avenue NW to Madison Avenue N	107	25	21.8	18 to 28	95%	25.0
Madison Avenue N to SR 305	110	25	23.3	18 to 28	93%	26.4
SR 305 to Ferncliff Avenue NE	110	25	27.2	22 to 32	86%	31.0

The speed survey reveals a high percentage of vehicles within the 10-mph pace speed for all segments, indicating a consistent flow speed. The posted speed limit is 25 mph throughout this corridor. The first two segments reveal that this speed is being followed closely. However, east of SR 305, as vehicles get farther away from the schools present between Lovell Avenue and Madison Avenue N, the 85th percentile speed increases to 31 mph.

Speed: Although speed is a concern in the eastern segment of this corridor, nearly every recorded collision occurred between Lovell and SR 305 in the first two segments, where speed was not an issue. This reveals that speed was not the major factor in the collision history, and lowering the posted speed limit would not improve the collision rate.

Parking: Eleven of the recorded collisions along this corridor were cited as being parking related. Numerous locations along this corridor offer street parking, including outside of the high school, along Madison Avenue north of the roundabout, and in front of the Best Western hotel, while the shopping center has a large parking

lot of its own with multiple access points along High School Road. Cars parked along a street, between the travel lanes and sidewalk act as a barrier to improve pedestrian safety; however, they can also act as an obstacle for drivers, especially as cars leave and enter the parking lane and open doors.

8.4 Issues and Candidate Mitigation

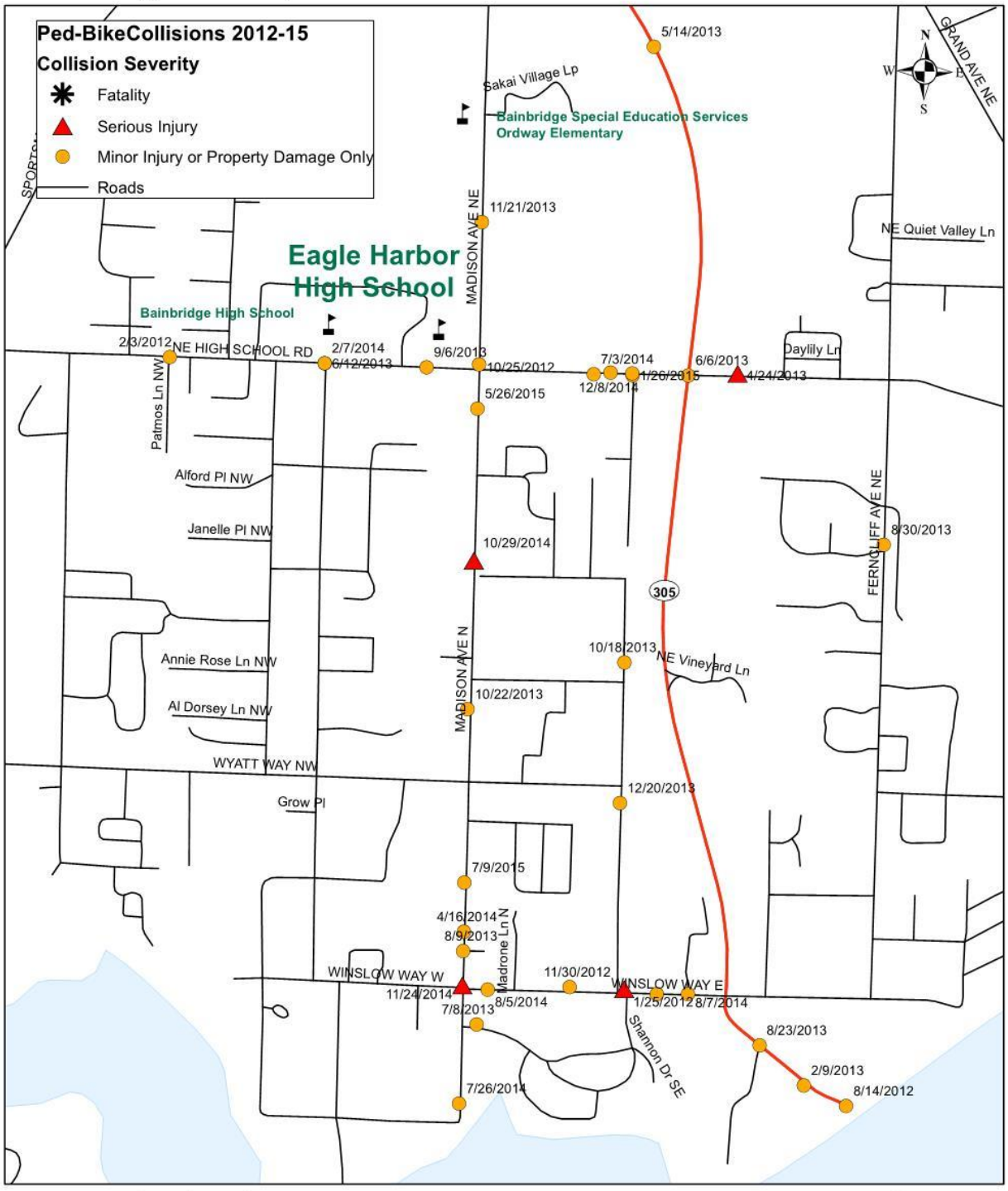
Pedestrian and Bicyclist Collisions: This corridor has the highest amount of non-motorized collisions in the City. Bike counts conducted by WSDOT also show that High School Road NW/NE has maintained a high ridership since 2013. One location with a high concentration of these collisions is near the crosswalk just west of Hildebrand Lane.

The close proximity of the traffic signal at SR 305 and High School Road NE could be impacting the safety of this crosswalk. Drivers begin to focus on the signal instead of the crosswalk and this could lead to collisions. The installation of a rapid rectangular flashing beacon, or RRFB, would increase the visibility of this crosswalk thus improving safety.

The only recorded serious injury related to a pedestrian or bicycle collision occurred east of SR 305. As noted above, this segment had the highest 85th percentile speed and a higher occurrence of speeding overall. The current channelization should be modified in this segment to improve pedestrian and bicyclist safety. A proposed channelization concept is shown in Figure 8-5. This proposal will increase the bicycle lane to a standard 6-feet and reduce the general purpose traffic lane to 10-feet. By decreasing the width for the general purpose lanes, it is expected that there will be a reduction in the travel speed of vehicles.

Pedestrian Crossing east of SR 305: A review of the pedestrian study conducted by the Transpo Group in May 2015 indicated that a pedestrian crossing was not warranted between SR 305 and Ferncliff Avenue NE. This was based primarily on the volume of pedestrians crossing at this location. Perteet reviewed this study and found that the observed pedestrian crossing volume is likely to remain the same. The likely pedestrian generators include the McDonald's restaurant on the southeast corner of High School Road NE and SR 305 and the Ace Hardware store located to the east of SR 305. Both are more readily accessed by the traffic signal at SR 305 and High School Road NE. The residential development on the north side of High School Road is not expected to generate more than 20 pedestrians per hour in the peak hour. Based on research from NCHRP 562, treatments such as rapid rectangular flashing beacons, HAWK beacons, or other enhanced pedestrian crossing treatments are warranted when pedestrian volumes exceed 20 pedestrians per hour. This location does not meet these requirements. As such, no additional pedestrian crossing treatments are warranted at this time.

Collisions Involving Pedestrians and Bicyclists
Bainbridge Island, 2012-2015



Under 23 United States Code - Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT or any jurisdiction invovled in the data.

Figure 8-4: Map of Pedestrian and Bicycle Collisions along High School Road and Surrounding Area

Figure 8-5: Proposed channelization for NE High School Road between SR 305 and Ferncliff Avenue NE

Figure 8-6: Proposed island extension for NE High School Road

8.5 Recommendation

The following is recommended for the High School Road NW/NE corridor:

1. Maintain the current speed limit for the corridor.
2. Extend island in front of Bainbridge High School further east to separate the parking area from the travel lanes.
3. Change the four western-most angled parking stalls near Hildebrand Lane to "back in/head-out". Remove the four eastern-most angled parking spots near Hildebrand Lane to avoid conflict with adjacent crosswalk.
4. Install a rapid rectangular flashing beacon (RRFB) at the crosswalk just west of Hildebrand Lane.

9.0 ENGINEERING AND SPEED SURVEY – MANZANITA ROAD NE CORRIDOR: NE RALSTON ROAD TO NE DAY ROAD

Manzanita Road NE is a residential road that runs north-south, connecting NE Bergman Road to Henderson Road NE. Manzanita Road NE has an average daily traffic volume of 550 vehicles per day (vpd). The primary objective for this study was to determine the appropriate speed limits for the corridor between NE Ralston Road and NE Day Road W. This study will refer to the entire study segment as Manzanita Road NE, though the portion between NE Hidden Cove Road and NE Ralston Road is actually Henderson Road NE. Figure 9-3 shows the project limits with the posted regulatory and warning signing along the roadway.

9.1 Project Area Description

Figure 9-1: Facing North

Figure 9-2: Facing South

Manzanita Road NE has a speed limit of 35 mph until just north of NE Day Road W where it changes to 25 mph south of this point. The attributes for the entire corridor are summarized in Table 9-1.

Table 9-1: Characteristics Summary by Zone for Manzanita Road NE

Item	North Speed Zone	South Speed Zone
Geometry		
Alignment	North-south	North-south
No. of Lanes (per direction)	1	1
Lane Width	9'	9'
Shoulder Width	0'	0'
Horizontal Curves	None	None
Vertical Curves	None	None
Surrounding Environment		
Setting	Forested	Forested
Roadside Ditches	Present	Present
Private Driveways	Infrequent	Infrequent
Pull-Out Areas	Present	Present
Clear Zones	Frequent obstacles, trees	Frequent obstacles, trees
Curb, Gutter and Sidewalk	Not present	Not present
Lighting	Not present	Not Present
Parking	Not present	Not present
Traffic Control		
Lane Markings	Marked centerline	Marked centerline
Speed Limit	35 mph	25 mph
Major Intersections	NE Hidden Cove Road, NE Ralston Road	NE Day Road W

9.2 Crash History

One collision was reported along this road between January 1, 2011, and December 31, 2014. The collision is summarized in Table 9-2.

Table 9-2: Crash Report Summary for Manzanita Road NE

Date	Time	Description
1/15/2011	11:45	VEH 1 STRUCK VEH 2 AFTER STEPPING ON WRONG PEDAL

There are no observed patterns in the crash history.

The crash rate for the corridor was calculated based on the number of reported crashes, daily traffic volumes, segment length, and crash history duration. Table 9-3 summarizes the crash rates for Manzanita Road NE, with a comparison to county and statewide averages.

Figure 9-3: Manzanita Road NE Corridor Map with Signing

Table 9-3: Crash Rates for Manzanita Road NE

Location	Crashes	Average Daily Traffic (vpd)	Study Length (miles)	Crash History (years)	Crashes per Million Veh-Miles
Manzanita Road NE	1	550	1	4	1.25
Kitsap County	-	-	-	-	1.54
Washington State	-	-	-	-	1.74

The corridor has a crash rate lower than the average for Kitsap County. The Federal Highway Administration (FHWA) recommends reducing speed limits if crash rates exceed the statewide average. The average crash rate for Washington State is 1.74 crashes per million vehicle-miles. This portion of Manzanita Road NE does not exceed this crash rate. Therefore, the speed limit should not be reduced because of crash history.

9.3 Issues and Candidate Mitigation

Speed: Throughout the corridor, the 85th percentile speed exceeds the posted speed limit at 36 mph. The crash rate, which is below the average county and state rates, and a review of the collision history do not indicate that speed is an issue. The USLIMITS2 analysis shows that the 35 mph speed limit is appropriate.

Lane Width and Clear Zone: The lane width along the corridor is 9-feet. Lane widths for a 35 mph corridor typically range from 10-feet to 11-feet. Lower lane widths typically result in slower speeds as drivers attempt to stay within the lane. The use of 9-foot lane widths typically can result in lower operational speeds. However, based on the observed speeds in this corridor, this is not the case. This could be the result of the low traffic volumes allowing vehicles to encroach on to the opposing lane. In most circumstances, this does not result in in unsafe operation. When present, bicyclists and pedestrians will likely be using the paved surface on the roadway. Motor vehicles will need to travel in to the opposing lane. To accommodate this maneuver safely, a lower operating speed will be required.

Based on the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide, the suggested clear zone for this roadway is 7 to 10 feet. Currently, there is no shoulder present on this road segment and there are frequent trees within this zone.

Bicycle Facilities: The City of Bainbridge Island's Non-Motorized Transportation Plan recommends a shoulder bike facility along both sides of Manzanita Road along this segment. The addition of bike lanes in this corridor would provide an increase in bicyclist safety.

9.4 Recommendation

The following is recommended for the Manzanita Road NE corridor:

Reduce the current speed limit to 30 MPH. This is due to:

- Narrow lane widths
- Inadequate clear zone areas

10.0 REFERENCES

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